BRYOZOA FROM CHESAPEAKE BAY.*

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The Bryozoa of Chesapeake Bay are interesting for several reasons: first, because of the unusual nature of the bryozoan fauna; second, the region is zoogeographically intermediate between the colder water fauna of New England and the subtropical fauna of Florida, and, third, there is almost no mention of this group between Southern New England and Florida in the literature.

The number of species taken by the Survey, nineteen, is much smaller than would have been expected from the area covered, and there is little doubt that a much larger number could be taken by careful collecting about the mouth of the bay. The purpose of the Survey was not to produce an extended list but to report the presence of the species occurring in certain areas. A large amount of material from more than 40 stations within the bay was carefully worked over. The stations extended from the mouth of the bay nearly to the city of Baltimore, but at the uppermost stations no Bryozoa were taken and most of the species were limited in distribution to the lower third of the region surveyed. Certain species of Ctenostomata were the only ones that could be considered abundant. One species of this group (*Victorella pavida*) is recorded for the first time in American waters, and another (*Amathia alternata*) has not been reported since Lamouroux reported it in 1824.

The bottom of the bay appears to consist almost entirely of mud, mixed in places with sand and shells. Apparently enormous masses of hydroid stems are drifted over the bottom. The writer assumed the task of separating the Bryozoa from the Hydrozoa and was continually astonished at the amount of dead hydroid material. It appears that most of this material must have been brought in by tides and currents from somewhere near the mouth of the bay, for these hydroids also do not flourish where the salt content is too low. Over a

*A report on the species of the off-shore waters collected by the Biological Survey of Chesapeake Bay, under the direction of Dr. R. P. Cowles. Published by permission of the United States Commission of Fisheries.

large part of the bay where Bryozoa may grow, these stems seem to be the only means of attachment for the various species recorded.

The water is made more or less brackish by the inflow from an unusual number of larger rivers; the Susquehanna, Patapsco, Patuxent, Potomac, Rappahannock, York and James, besides numerous smaller streams. No doubt this has an important bearing on the distribution of the Bryozoa, few of which are able to live in water that is less than two thirds of the salinity of pure sea water. According to records for 1920, 1921 and 1922, the salinity varies from about .7% near Baltimore to about 3.2% at the mouth of the bay. Only the bottom records are considered as the Bryozoa are all attached species. The salinity of the open ocean averages about 3.5 % of salts, and about 2.0% seems to be the lower limit of salinity for most of the bryozoan species.

The whole region within the bay is very shallow, 45.75 meters being the greatest depth, near the mouth of the bay, while most of the stations show less than one-third of this depth. Such a body of water influenced by a large inflow from the rivers, necessarily fluctuates greatly in temperature, even at the bottom, and this also no doubt affects the distribution of the species.

ENDOPROCTA

Barentsia discreta (Busk).

Sta. 8903, not far from the mouth of the bay, at 47.75 meters. One small colony attached to a stalk of *Amathia alternata*. A widely distributed species, but recorded rather infrequently. On the North American coast the writer has taken it at Woods Hole, Massachusetts; Beaufort, North Carolina, and the Tortugas Islands, Florida.

ECTOPROCTA

Cyclostomata

Crisia eburnea (Linnaeus).

Sta. 8850, 8938 and 8940, all in the lower third of the bay. The species is cosmopolitan in distribution.

Cheilostomata

Bugula turrita (Desor). (Plate I, Fig. 1.)

Sta. 8827, mouth of bay, 18.3 meters, two small colonies attached to shell fragments. This abundant species of the southern New England region appears to be much less common south of New Jersey, though the writer has taken it as far south as Beaufort, North Carolina.

Bugula gracilis var. *uncinata* Hincks.

Sta. 8893, not far from the mouth of the bay, at 44.83 meters. The species is known from Woods Hole and Lynn, Massachusetts, from England and Madeira. Where found it does not seem to be a common species, but probably its optimum habitat has not been located.

Nitscheina (*Membranipora*) *membranacea* (Linnaeus).*

Sta. 8949, at 7.78 meters, about half way up the bay, one colony on algae. It was also taken at another station the number of which was obliterated, but the date indicates that the location is somewhere off the city of Annapolis. This is the farthest up the bay that any bryozoan species was taken. *N. membranacea* is well known for its tolerance of brackish water conditions in various regions of the world.

Electra (*Membranipora*) *pilosa* (Linnaeus).

Sta. 8838, mouth of bay, 16.4 meters, one colony on a shell fragment. A very widely distributed species.

Electra (*Membranipora*) *monostachys* (Busk).

Sta. 8838, at mouth of bay, 16.4 meters, on shell fragments. Widely distributed in the North Atlantic.

Hemiseptella (*Membranipora*) *denticulata* (Busk).

Occurring at nine stations well distributed over the lower part of the bay and north to the mouth of the Potomac River. The lowest salinity where it occurred was about 1.5‰. One colony was bilaminate and spread from branch to branch of a hydroid. A common species from Cape Cod southward to Florida and found also on the west coast of Mexico.

Hippothoa hyalina (Linnaeus).

Sta. 8827, mouth of bay, 18.3 meters. A very widely distributed species.

Schizopodrella unicornis (Johnston).

Sta. 8173, near mouth of bay, 12.8 meters. Also a common species occurring over a very wide range.

Microporella ciliata (Pallas).

Sta. 8173, mouth of bay, 18.3 meters. Cosmopolitan in range.

Ctenostomata

Alcyonidium polyoum (Hassall), (*A. mytili* Dalyell).

Sta. 8827, near mouth of bay, one colony on a shell. Widely distributed.

Alcyonidium verrilli Osburn. (Plate I, Figs. 2 and 3.)

Taken at 22 stations ranging all over the lower part of the bay

*For references and synonymy see Osburn, Bryozoa of the Woods Hole Region, Bul. U. S. Bureau of Fisheries, Vol. XXX, No. 760, 1912. The generic names in parenthesis are those used in that report.

up to above the mouth of the Potomac River, at depths ranging from 7.3 to 45.75 meters. The lowest salinity observed was at the mouth of the Potomac River, 1.319%. This species was the most abundant and widely distributed of all the Bryozoa taken by the Survey. Numerous young colonies incrusted hydroid stems, and larger colonies, branching freely, rose to height of 100 to 125 mm., with branches 3 to 5 mm. in diameter. The colony appears to begin as a thin layer, which later rises into the erect branching form. In consistency this species is much firmer than *A. gelatinosum* and *A. hirsutum*, both of which grow in somewhat the same branching form.

Hitherto the species has been recorded only from southern New England and New Jersey.

Alcyonidium parasiticum (Fleming).

Sta. 8838, mouth of bay, 16.4 meters, encrusting hydroid stems.

Anguinella palmata Van Beneden.

Taken at eight stations, all well within the bay in the general region of the mouth of the Potomac River, the salinity ranging from about 1.3 to 2.1%. This distribution appears to be characteristic since at Beaufort, North Carolina, where the species is abundant, it thrives especially on the piles of docks well within the harbor, and at Buzzard's Bay, which appears to be its northern limit, it occurs in a similar situation.

Bowerbankia gracilis Leidy.

Noted at five stations ranging from near the mouth of the bay to about three-fifths of the way toward the head, the salinity varying from 1.5 to 2.4%. All of the colonies were spreading over hydroid stems, sometimes covering them as with a dense fur. Most of the specimens were of the variety *caudata* of Hincks.

Amathia alternata Lamouroux. (Plate I, Fig. 4.)

1816, Hist. Pol. Cor. Flex., p. 160.
1821. Exp. Method, p. 10, Pl. LXV, Figs. 18–19.
1824, Encycl. Method, p. 44.

Recorded from seven stations all in the lower fifth of the bay, at depths ranging from 12.8 to 45.75 meters. The species is not so abundant, nor does it reach so large a size as it does farther south, though the largest colonies attained a height of 75 mm. It has not been recorded for the coastal waters of North America, although the writer has found it to be very abundant at Beaufort, North Carolina, where it is thrown up on the outer beaches in great numbers. The erect, tree-like, light brownish colonies, with their spirally arranged zooecia and tough stems, are like nothing else in our fauna. The larger stems measure about .5 mm. in diameter, the retracted zooecia average about .6 mm. in length by about .135 mm. in width and in each group they are graduated somewhat in length from the lower zooecia upward. The spirals may alternate in direction, turning either to right or left in the same colony.

It appears unusual that so large and striking a species should not have been recorded by anyone for more than a century and remain known only from the type material, but the species of Amathia are not very well known and it is possible that it has been recorded under another name. Lamouroux, in his first description named Deshayes as the collector and the locality as "mer d'Amerique," but in his revised statement in 1824 he gives the locality as "mer des Antilles," with the same collector. The probability therefore is that Deshayes found the species somewhere about the West Indies.

I am indebted to Dr. Sidney F. Harmer, the eminent English authority on the Bryozoa, for his opinion, confirming my own, that this species is the *alternata* of Lamouroux.

Victorella pavida Saville Kent. (Plate I, Fig. 5.)

Kent, Quart. Jour. Micr. Sci., n. s., Vol. X, p. 34, Pl. IV.
Hincks, British Marine Polyzoa, p. 561, Pl. LXXIX, Figs. 4–7.
Kraepelin, Abhand. Verein Hamburg, Vol. X, Taf. III, Fig. 75.

Taken at four stations, 8874, 8883, 8891, and 8893. The distribution ranges from near the mouth of the bay to well above the mouth of the Potomac River, with the salinity varying from 1.7 to 2.7%. This species was a surprise in the collection as it had not been previously recorded from American waters, though it is known from England, Germany and Australia. It is supposed to occur only in waters of slight salinity, "amongst a prevailing fluviatile fauna," (Hincks).

The zooecia look like those of a very delicate *Bowerbankia* in general appearance, though the type of budding is quite different (Fig. 5), there is no gizzard and there are only 8 tentacles. Knowing the variability in appearance of many ctenostomes in different states of preservation, I was somewhat doubtful of my determination of the species as *V. pavida*, and submitted specimens to Messrs. S. F. Harmer and R. Kirkpatrick of the British Museum for comparison. Kirkpatrick writes as follows: "Your example differs a good deal from the typical material, but on the other hand resembles closely the figures of Kraepelin. We are both inclined to think you would not be far wrong if you named your specimen *Victorella pavida*." So the determination stands at present and must remain until better preserved material can be properly studied.

Triticella (*Hippuraria*) *elongata* (Osburn).

In the gill chamber and spreading slightly on the outside of the shell of a blue crab (*Callinectes sapidus*) from Fish Hawk Sta. 8498,

Chesapeake Bay. No crabs were sent me by the Survey, but one of two specimens received from the U. S. National Museum bore this species, which seems always to be associated with crabs, especially spreading over the walls of the gill chamber. *T. elongata* is probably common enough on various species of the Chesapeake crabs, as the writer has taken it at Woods Hole, Massachusetts, and more abundantly at Beaufort, North Carolina, on the blue crab, the spider crabs (*Libinia* spp.) and on the species of *Pinnixia* which inhabit the tubes of the worm, *Chaetopterus.*

It is worthy of note that in the preceding list nearly all of the species have a very wide distribution. Only four, *Bugula turrita*, *Alcyonidium verrilli*, *Amathia alternata* and *Triticella elongata*, are limited, as far as our present knowledge goes, to the Atlantic Coast of North America.

EXPLANATION OF PLATE.

Fig. 1. *Bugula turrita* (Desor), a well developed specimen from Long Island Sound. Natural size.

Figs. 2 and 3. *Alcyonidium verrilli* Osburn, showing differences in form of colony. About one-half natural size.

Fig. 4. *Amathia alternata* Lamouroux, a typical colony but spread out somewhat for photographing. The opposite direction of the spirals may be observed on some branches. Natural size.

Fig. 5. *Victorella pavida* Kent, diagrammatic drawings showing mode of branching and other details.

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PLATE I.